

## CLAIMS

1. An alternating current signal level detection circuit comprising:
  - a first determination unit (52, 82) which determines whether or not a signal level of an alternating current signal passes over a first reference voltage (V2) which is higher  
5 than zero from a lower side to a higher side;
  - a second determination unit (40, 70, 90) which determines whether or not the signal level of the alternating current signal exceeds a second reference voltage (V1) which is higher than the first reference voltage (V2);
  - a storage unit (53, 54, 83, 84) which stores a first determination result of said first  
10 determination unit (52, 82) and a second determination result of said second determination unit (40, 70, 90); and
  - a determination signal output unit (53b, 55, 85, 86) which refers to the determination results stored in said storage unit (53, 54, 83, 84), determines whether the signal level of the alternating current signal is high or low based on the determination results referred to,  
15 and outputs a high-low determination signal as a result of the determining.
2. The alternating current signal level detection circuit according to claim 1, wherein said determination signal output unit (53b, 55, 85, 86):
  - refers to the first determination result of said first determination unit (52, 82) and the determination result of said second determination unit (40, 70, 90) which are stored in  
20 said storage unit (53, 54, 83, 84);
  - outputs a high-low determination signal representing that the signal level of the alternating current signal is high, when said storage unit (53, 54, 83, 84) stores the first determination result representing that the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side, and the  
25 second determination result representing that the signal level of the alternating current signal exceeds the second reference voltage (V1); and
  - outputs a high-low determination signal representing that the signal level of the

alternating current signal is low, when said storage unit (53, 54, 83, 84) stores the first determination result representing that the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side and the second determination result representing that the signal level of the alternating current  
5 signal is equal to or lower than the second reference voltage (V1).

3. The alternating current signal level detection circuit according to claim 2, wherein said determination signal output unit (53b, 55) outputs the high-low determination signal by referring to the first determination result and the second determination result stored in said storage unit (53, 54) when the signal level of the  
10 alternating current signal passes over the first reference voltage (V2) from the higher side to the lower side.

4. The alternating current signal level detection circuit according to claim 2, wherein said determination signal output unit (83b, 85, 86) outputs the high-low determination signal by referring to the first determination result and the second  
15 determination result stored in said storage unit (83, 84) when the signal level of the alternating current signal exceeds the second reference voltage (V1) and when the signal level of the alternating current passes over the first reference voltage (V2) from the higher side to the lower side.

5. The alternating current signal level detection circuit according to claim 3,  
20 wherein

said first determination unit comprises a first comparator (52) which compares the signal level of the alternating current signal with the first reference voltage (V2), and outputs, when the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side, the first determination result  
25 representing this fact,

said second determination unit comprises a second comparator (42) which compares the signal level of the alternating current signal with the second reference voltage (V1),

and outputs, when the signal level of the alternating current signal exceeds the second reference voltage (V1), the second determination result representing this fact,

said storage unit comprises:

a reset signal output unit (53a) which generates and outputs a reset signal (P1)  
5 based on the first determination result of said first comparator (52) representing that the signal level of the alternating current signal exceeds the second reference voltage (V1);  
and

a reset-set flip-flop circuit (54) which outputs a Q signal which is reset based on the reset signal (P1) generated by said reset signal generation unit (53a) and which is  
10 set based on the second determination result of said second comparator (42) representing that the signal level of the alternating current signal exceeds the second reference voltage (V1), and stores a reset or set status of the Q signal as the first determination result or the second determination result, and

said determination signal output unit comprises:

15 a timing signal output unit (53b) which generates and outputs a timing signal (P2) based on the first determination result of said first comparator (52) representing that the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side; and

a delay flip-flop circuit (55) which refers to the reset or set status of the Q  
20 signal output from said reset-set flip-flop circuit (54) when the timing signal (P2) is output from said timing signal output unit (53b), and outputs a signal having a same status as the status referred to, as the high-low determination signal.

6. The alternating current signal level detection circuit according to claim 4,  
wherein

25 said first determination unit comprises a first comparator (82) which compares the signal level of the alternating current signal with the first reference voltage (V2), and outputs, when the signal level of the alternating current signal passes over the first

reference voltage (V2) from the lower side to the higher side, the first determination result representing this fact,

said second determination unit comprises a second comparator (72) which compares the signal level of the alternating current signal with the second reference voltage (V1),  
5 and outputs, when the signal level of the alternating current signal exceeds the second reference voltage (V1), the second determination result representing this fact,

said storage unit comprises:

a reset signal output unit (83a) which generates and outputs a reset signal (P1) based on the first determination result of said first comparator (82) representing that the  
10 signal level of the alternating current signal exceeds the first reference voltage (V2); and

a reset-set flip-flop circuit (84) which outputs a Q signal which is reset based on the reset signal (P1) generated by said reset signal generation unit (83a) and which is set based on the second determination result of said second comparator (72) representing that the signal level of the alternating current signal exceeds the second reference voltage  
15 (V1), and stores a reset or set status of the Q signal as the first determination result or the second determination result, and

said determination signal output unit comprises:

a timing signal output unit (83b) which generates and outputs a timing signal (P2) based on the first determination result obtained by determination of said first  
20 comparator (82);

a delay flip-flop circuit (85) which refers to the reset or set status of the Q signal output from said reset-set flip-flop circuit (84) when the timing signal (P2) is output from said timing signal output unit (83b), and outputs a signal having a same status as the status referred to; and

25 a logical OR operation unit (86) which implements a logical OR operation of an output signal from said reset-set flip-flop circuit (84) and said delay flip-flop circuit (85), and outputs a result of the logical OR operation as the high-low determination

signal.

7. The alternating current signal level detection circuit according to claim 6, comprising a first power source having the first reference voltage (V2) and a second power source having the second reference voltage (V1), wherein:

5       said first power source lowers the first reference voltage (V2), when the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side; and

          said second power source lowers the second reference voltage, when the signal level passes over the second reference voltage from a lower side to a higher side.

10       8. An alternating current signal level detection circuit comprising:

          a first determination unit (52) which determines whether or not a signal level of the alternating current signal passes over a first reference voltage (V2) which is higher than zero from a lower side to a higher side;

          a second determination unit (43) which determines whether or not the signal level of  
15 the alternating current signal exceeds a plurality of second reference voltages (V1, V3) which are higher than the first reference voltage (V2), and outputs either one of them as a second determination result;

          a storage unit (53a, 54) which stores a first determination result of said first determination unit (52) and the second determination result output from said second  
20 determination unit (43); and

          a determination signal output unit (53b, 55) which refers to the determination results stored in said storage unit (53a, 54), determines whether the signal level of the alternating current signal is high or low based on the determination results referred to, and outputs a high-low determination signal as a result of the determining.

25       9. The alternating current signal level detection circuit according to claim 8, comprising a first power source having the first reference voltage (V2), and a second power source having the second reference voltage (V1), wherein:

said first power source lowers the first reference voltage (V2) when the signal level of the alternating current signal passes over the first reference voltage (V2) from the lower side to the higher side; and

said second power source lowers the second reference voltages (V1, V3) when the  
5 signal level passes over the second reference voltages from a lower side to a higher side.